

## Introduction/Business Problem

A patron of classical arts wants to open a theater near Boston City Hall. Of course, as this will be a new theater, the patron needs to attract customers to develop a customer base. To do so, he contacts a marketing agency to find out which places in Boston would be best to advertise the new theater. These places would constitute an optimal set of venues for both physical and virtual advertising. To carry out the project, the marketing agency will use the Foursquare API to collect information about venues in Boston and construct a system to rank which venues would be best for advertising the new theater. Foursquare is a data and intelligence company that provides location data for venues around the world. For example, one could use Foursquare as a simple search engine or for a more detailed description of venues. Developers may use the Foursquare API to freely gather limited location data or have access to more location data for a fee. Unfortunately, due to lack of funding, the data gathered from the Foursquare API will only be the free data accessible to developers. The marketing agency hopes that this project would be able to be further improved and models further generalized for a wider audience of advertisers.

## Data

The marketing agency will come up with a ranking system to determine the best venues in Boston for advertising the theater near Boston City Hall. The data to be used in this ranking system will come exclusively from the Foursquare API.

First, the marketing agency will gather data for the top 100 venues around Boston City Hall (using latitude and longitude geographic coordinates) based on the Foursquare API “explore” query. The “explore” endpoint shows the top venues around a location ranked by Foursquare. Location data for these venues are then available. Boston City Hall has geographic coordinates (42.360100, -71.058900) for latitude and longitude, respectively. An example of the available location data results shown by this “explore” endpoint for Boston City Hall is shown in Table 1 for the top 5 venues from this search.

**Table 1.** The top 5 venues around Boston City Hall according to the Foursquare API explore endpoint. The name, category (type of venue), and latitude and longitude location for each venue are given. In addition, the distance from Boston City Hall in meters for each venue are shown.

Name	Category	Latitude	Longitude	Distance (meters)
Boston Athenaeum	Library	42.35748	-71.0618	378
North End Park	Park	42.36249	-71.0565	332
Sam LaGrassa's	Sandwich Place	42.35687	-71.06	369
Faneuil Hall Marketplace	Historic Site	42.35998	-71.0564	205
Boston Public Market	Market	42.36195	-71.0575	237

After using the “explore” endpoint to find the top 100 venues around Boston City Hall, the marketing agency will use a methodology to determine the most appropriate venues for advertising. This methodology will be applied to the top 100 venues around Boston. The methodology is based on the

idea that venues from which people then went to theaters would be good sites for theater advertising. In other words, if people went to a theater after visiting a particular venue, then that venue is a good place to advertise for a theater. This is a reasonable assumption since people who go to theaters are more likely to go to a theater again than people who don't go to theaters. With this observation, a filtering process will be used based on the "nextvenues" endpoint from the Foursquare API. This endpoint shows the top 5 venues people visited from a given venue. Table 2 shows a sample of the "nextvenues" results for the top 5 venues from the "explore" endpoint for Boston City Hall shown in Table 1. The data that will be used from the "nextvenues" endpoint will be the category for each of the 5 next venues.

*Table 2. The 5 next venues and their category that people visited from the venues listed in Table 1.*

Name	Next Venue 1/ Category	Next Venue 2/ Category	Next Venue 3/ Category	Next Venue 4/ Category	Next Venue 5/ Category
<b>Boston Athenaeum</b>	Boston Common/ Park	Scollay Square/ American Restaurant	Emmet's Irish Pub/ Irish Pub	Faneuil Hall Marketplace/ Historic Site	21st Amendment/ Pub
<b>North End Park</b>	Mike's Pastry/ Pastry Shop	Paul Revere House/ Historic Site	Quincy Market/ Historic Site	Faneuil Hall Marketplace/ Historic Site	Neptune Oyster/ Seafood Restaurant
<b>Sam LaGrassa's</b>	Boston Common/ Park	Quincy Market/ Historic Site	Faneuil Hall Marketplace/ Historic Site	Thinking Cup/ Café	Samuel Adams Brewery/ Brewery
<b>Faneuil Hall Marketplace</b>	Quincy Market/ Historic Site	Cheers/Bar	Mike's Pastry/ Pastry Shop	Newbury Comics/ Record Shop	Paul Revere House/ Historic Site
<b>Boston Public Market</b>	Quincy Market/ Historic Site	Faneuil Hall Marketplace/ Historic Site	George Howell Coffee/Coffee Shop	Mike's Pastry/Pastry Shop	Union Oyster House/ Seafood Restaurant

In addition to the "nextvenues" category data for the top 100 venues near Boston City Hall, specific attributes about each of these venues will be used: "rating", "likes", and "distance" from Boston City Hall. The "rating" attribute is the average rating given to a particular venue by Foursquare users, the "like" attribute is the total number of Foursquare users that liked a particular venue, and the "distance" attribute in this case is just the distance of a particular venue from Boston City Hall in meters. Thus, the relevant location data to be used in the ranking system are given below.

#### **Foursquare Location Data to be Used:**

- Top 100 venues from "explore" endpoint for Boston City Hall
- "Rating", "likes", and "distance" (from Boston City Hall) attributes for each of these top 100 venues.
- The "category" of each venue in the "nextvenues" endpoint for each of these top 100 venues.